Research in Progress

Understanding the Chemical and Mechanical Performance of Snow and Ice Control Agents on Porous or Permeable Pavements (CR 12-03)

Subcommittee: Mike Lashmet (champion), Tim Chojnacki, Paul Brown (non-voting), Tim Croze, Cliff Spoonemore, Clay Adams

Investigator: Western Transportation Institute

Expected results: Best practice guidelines to help determine the optimum winter maintenance strategies for porous or permeable asphalt pavements.

Expected completion date: February 2017

Current Status: The research team is obtaining cores from MassDOT to create slabs for testing.

Anticipated Implementation & Benefit Opportunity: This project could be used to help construction staff understand the maintenance cost impact of porous and permeable pavements or help maintenance staff identify the most efficient ways to safely clear those pavements types during winter events.

Snowplow Operator and Supervisor Training (CR 12-04)

Subcommittee: Mike Sproul (champion), Justun Juelfs, David Wieder, Clay Adams, Mike Lashmet, Cliff Spoonemore, Monty Mills, Dave Frame

Investigator: University of Minnesota

Expected results: Winter maintenance training materials for operators and supervisors that includes presentations, course guides, exams and other supporting materials.

Expected completion date: November 2016

Current Status: All 18 modules are complete and the research team is receiving comments from TAC. An amendment has been processed for 6 additional modules, including one on winter driver education.

Anticipated Implementation & Benefit Opportunity: This curriculum should be an easy, low-cost way to fill any gaps in an agency's training program. Presentations, course guides and exams will be available to all member states to modify or update as needed, saving agencies time on developing effective training materials.

Synthesis on GPS/AVL Equipment Used for Winter Maintenance (CR 14-01)

Subcommittee: Patti Caswell (champion), Cliff Spoonemore, Tim Peters, Tom Renninger, Scott Lucas, James Morin, Joe Schmit (non-voting WS DOT)

Investigator: SRF Consulting

Expected results: A "consumer reports" type of digest analyzing the different GPS/AVL systems in winter maintenance, including how well each one performs and systems requirements and constraints.

Expected completion date: September 2016

Current Status: The research team has conducted the closeout webinar and submitted a draft final report. Comments from subcommittee due first week of June.

Anticipated Implementation & Benefit Opportunity: The results of this project will help states better understand the options available (systems and components) for varying situations and truck configurations and identify the best solutions for their circumstances. It will also help states learn from the lessons of those agencies on the cutting edge of the technology.

Quantifying the Impact that New Capital Projects Will Have on Roadway Snow and Ice Control (RSIC) Operations (CR 14-02)

Subcommittee: Wayne Gammell (champion), David Wieder, Joseph Baker, Brad Darr, Larry Gangl (non-voting ND DOT), Caleb Dobbins

Investigator: University of Vermont

Expected Results: An automated method of quantifying the anticipated impact that new capital projects will have on the costs for winter maintenance.

Expected completion date: July 2017

Current Status: The survey of AASHTO's snow and ice community to determine the 6 to 10 roadway configuration changes that are common across snowbelt states is complete. The research team also used STIPs of states that completed the survey and nearby states to supplement the survey results. Currently developing a methodology to assess impacts. From the survey results and the STIPs, a total of 8 case studies were selected in Minnesota, New Hampshire, and Vermont. Each of these case studies is a project that is expected to be completed or substantially completed in 2016. Detailed second-by-second GPS data was collected from the plow trucks in New Hampshire and Minnesota that cover these project areas to examine the effort that it takes currently to service these routes. This data collection will be repeated next winter. In Vermont, the 4 case studies will be investigated using the statewide RSIC simulation to assess the more far-reaching impacts of these projects. Work on the RSIC simulation model is ongoing.

Anticipated Implementation & Benefit Opportunity*:* Help maintenance and construction staff better predict the financial impacts on winter maintenance of new construction projects.

Developing a Training Video and Manual for Best Practices and Techniques in Clearing Different Interchange Configurations and Other Geometric Layouts (CR 14-03)

Subcommittee*:* Justin Droste (champion), Kyle Stollings, Mike Sproul, Sam Salfity, David Wieder

Investigator: Southern Illinois University Edwardsville

Expected Results: A 15-20 minute video that showcases the most efficient pass sequences to properly clear various interchange and intersection layouts.

Expected completion date: March 2017

Current Status: The research team, working with the project subcommittee, developed 9 intersection/ interchange diagrams and gathered common practices for clearing snow from these geometries. The subcommittee approved the survey and it was emailed to the TAC and Snow/Ice List Serve on March 22.

Anticipated Implementation & Benefit Opportunity: The resulting videos should provide an easy way for agencies to train staff on the most efficient ways to clear challenging interchanges.

Plug and Play, Phase II (CR 14-04)

Subcommittee*:* Allen Williams (champion), Paul Brown (non-voting), John Scharffbillig (non-voting City of Minneapolis), Craig Bargfrede, Scott Lucas, David Wieder

Investigator: SRF Consulting

Expected Results: Further the goals of the Plug and Play initiative by standardizing transmission methods and protocols for the transmission of data from vehicle to point location.

Expected completion date: January 2017

Current Status: The survey responses are in for the agency survey. The industry (trucking) survey has been sent out and is currently collecting responses.

Anticipated Implementation & Benefit Opportunity: Integration of new components onboard winter maintenance vehicles will be easier and cheaper for all states if the specifications and standards are adopted by Clear Roads members.

Snow Removal Performance Metrics, Phase I: Synthesis (CR 14-05)

Subcommittee: Allen Williams (champion), Mike Lashmet, Peter Carttar (non-voting), Tim Chojnacki, Brian Burne, Craig Bargfrede, Lee Smithson (non-voting)

Investigator: Washington State University

Expected Results: A matrix of agency goals, performance measures, and costs associated with gathering various measures.

Expected completion date: July 2016

Current Status*:* A revised analysis matrix of the survey results has been submitted. Awaiting the draft final report. Final conference call to discuss should take place in mid-June with a closeout webinar at the end of June.

Anticipated Implementation & Benefit Opportunity: This project will help agencies learn from each other regarding successful performance metrics for assessing the efficiency and effectiveness of winter maintenance activities.

Identifying Best Practices for Snowplow Route Optimization (CR 14-07)

Subcommittee: Clay Adams (co-champion), Brad Darr (co-champion), Peter Carttar (non-voting KDOT), Daryl St. Clair, Larry Gangl (non-voting ND DOT), Mike Lashmet, Justun Juelfs

Investigator: University of Vermont

Expected Results: A matrix that illustrates the pros and cons of each optimization approach whether it was a methodology produced in-house or using a Commercial Off-The-Shelf software solution.

Expected completion date: January 2017

Current Status: The literature review and survey questions have been approved.

Anticipated Implementation & Benefit Opportunity: This project will assist agencies in identifying better ways to determine 'where' and 'how many plow trucks' should be deployed for a given area – and – if there is a specific way to set up routes for maximum efficiency. It will also help agencies assess the viability of facility locations to identify opportunities for greater efficiency.

Synthesis of Material Application Methodologies for Winter Operations (CR 15-01)

Subcommittee: Jeff Pifer (Champion), Paul Brown, John DeCastro, Tom Peters, Rick Nelson, Max Perchanok

Investigator: Washington State University

Expected Results: A key deliverable of this project will be a handbook that is succinct, decisive in its instructions and recommendations, and professionally created.

Expected completion date: 15 months

Current Status: Project just kicked off in early-May.

Anticipated Implementation & Benefit Opportunity: This handbook will provide winter maintenance professionals with the ability to easily access the needed information to drive implementation. This includes best management practices for application rates, material application methodologies and material usage, including chloride brines applied directly or as additives to abrasives and rock salts.

Identification and Recommendations for Correction of Equipment Factors Causing Fatigue in Snowplow Operations (CR 15-02)

Subcommittee: Allen Williams (Champion), Cliff Spoonemore, Patti Caswell, Tim Chojnacki, Tom Renninger, Wayne Gammell

Investigator: Virginia Polytechnic Institute and State University

Expected Results: This project will produce actionable and implementable improvements able to be applied to snowplow trucks. Therefore, recommendations that can provide quick turnaround and low cost solutions are preferred, but more in-depth and higher cost solutions may also be considered.

Expected completion date: November 2017

Current Status: Project just kicked off in mid-June.

Anticipated Implementation & Benefit Opportunity: The ideas and concepts that are generated by this project may be implemented by state DOTs and shared with the trucking industry. These possible improvements should increase the safety both to our operators and to the traveling public.

North American Study on Contracting Snow and Ice Response (CR 15-03)

Subcommittee: Justin Droste (champion), Paul Brown, Caleb Dobbins, Allen Williams, Mike Lashmet

Investigator: Western Transportation Institute

Expected Results: A final report will be produced that will document the costs, benefits, practices, and complexities associated with contracting to perform snow and ice control functions.

Expected completion date: February 2017

Current Status: The literature review has been submitted to the subcommittee for their review.

Anticipated Implementation & Benefit Opportunity: The analysis will provide states with the information needed to modify and improve their own snow and ice control contracting practices to save money and managing resources.

Research/Synthesis Projects Funded for FY 2016

RESEARCH

Utilization of AVL/GPS Technology: Case Studies

Description: The goal of the project is to document case studies of agencies that have implemented an automatic data collection system for winter maintenance. Document lessons learned, the key factors that influenced the decision to pursue AVL/GPS, at what level it was implemented, and how to share the data internally and externally.

Funding: $125,000

Aurora WSI Update/Enhancement Partnership

Description: The goal of this project would be to partner with Aurora to update the programming for the Winter Severity Index (WSI) System, discuss the possibility of a WSI estimator tool, and to develop a strategy for ongoing operation.

Funding: $20,000

Identification of Technologies for the Assessment of Winter Roads Conditions

Description: Identify, compare, and evaluate technology that can objectively assess and report roads conditions. Combined this proposal with the proposal entitled, ***Friction and Temperature Sensors - Mobile and Stationary Weather Stations*** and added funds to cover the aspects of both in one project.

Funding: $200,000

Emergency Operations Methodology for Extreme Winter Storm Events

Description: The goal of this project is to identify how states currently handle pre-storm and during-storm planning and execution of plans to improve the management and response to severe and extreme winter weather events, as well as provide guidance to develop comprehensive response plans.

Funding: $75,000

Weather Event Reconstruction & Analysis Tool

Description: The purpose of this research project would be to build a weather event reconstruction tool that can pull together various pieces of official information to help agencies conduct after-action studies and prepare after-action reports.

Funding: $60,000

Training Video for the Implementation of Liquid Only Plow Routes

Description: The goal is to be able to effectively implement liquid only plow routes utilizing experiences from agencies already using the practice.

Funding: $75,000

SYNTHESIS

Best Management Practices for the Accurate Reporting of Salt Stockpiles

Description: Stockpile numbers are always off from manually reported numbers. This synthesis will compile policies and best practices that get the reported number closer to actual. It will identify if there is any technology that is being used, who is using it, how is it working and how do they use it.

Finding the Most Cost Effective Wash Bay

Description: Identify wash bay systems used by other states and gather information about their effectiveness at reducing corrosion. The synthesis should include those systems that are self-contained or have a filtration system that allows the water to be used again.

Proposed Projects That Were Not Selected For Funding

RESEARCH

Stockpile Reports, Stockpile Measurement and Volume Calculation Application

Description: Evaluate the usability of the Stockpile measurement technology to asses a more accurate inventory of current stockpile volumes.

Effectiveness of Residual Salt on the Roadway

Description: Provide timeframes that residual salt remains effective for various application rates, road types, and weather conditions. Evaluate sensors that detect salt levels.

Study to Identify the Complexities on Winter Levels of Service

Description: To identify the complexities that are involved in setting and achieving winter maintenance Levels of Service.

Use of Sacrificial Coatings to Protect Equipment from Deicer Corrosion

Description: Identify various sacrificial coating options and evaluate their performance and cost benefits as a function of typical equipment and exposure scenarios of interest. The goal is to develop guidelines for DOTs to adopt the cost-effective sacrificial coating treatments to reduce the corrosion effects of deicers to equipment assets and extend their service life.

Evaluating Methods for Pre-Wetting Abrasives

Description: Evaluate various setups to determine the most effective way to pre-wet at the chute. Factors to evaluate include: where the pre-wet comes in, how many source points are ideal, type of nozzle, for set pre-wet amounts (5-12 gallons per mile), for both cinder and ¼" minus quarry rock, and up to two additional commonly used abrasive materials (or solid salt).

Accuracy of Liquid and Granular Spreaders to Apply and Record Targeted Quantities of Material

Description: To test various calibrated liquid and granular spreaders to determine their ability to apply targeted quantities of various materials for extended periods of time and record accurately to the controller.

Reducing Snow Plow Driver Fatigue by Modifying Human Behavior

Description: This project would confirm or reject the link between drivers' quality of rest and driver fatigue. If confirmed, the investigator would develop a series of training materials for managers and drivers to help improve the quality of rest for drivers, as well as practices managers can use during operations to identify and relieve the fatigue in drivers.

SYNTHESIS

Evaluation of the Use of AVL in Winter Maintenance: A Synthesis of States Perspectives and Experiences

Description: This synthesis will provide up-to-date information on AVL, including efficiencies gained, costs savings, different uses for the technology, and what multiple states have done to implement it.

Spring Road Ban Posting Criteria

Description: Survey snow and ice states and investigate past research as to the criteria that states currently use to post load restrictions on their roads at the cessation of the winter months. The study should consider both the effect of the onset of the spring weather, as well as factors that make roads more susceptible due to the nature of their construction.